

1. Employee No. 296 ad

Name (Last, First, MI)

3. Div/Dept. No. 039 / CC 350

4. Report No.

5. Dates of Expense: From 9-28-95 To 9-29-95

Genise, Thomas A.

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
Date					<u>9-28-95</u>	<u>9-29-95</u>		
City					<u>DeMotte</u>	<u>Galesburg</u>		
State/Country					<u>IA</u>	<u>ME</u>		
Meals						<u>13</u> <u>11</u>		<u>13</u> <u>11</u>
Incidentals								
Hotel/Motel								
Accounting Use Only								
County Code								
Per Diem Rate								
Variance								
Telephone					<u>6</u> <u>74</u>			<u>6</u> <u>74</u>
Taxi, Auto Rental, Local Transp.								
Rate <u>28¢</u> per mile (miles)						<u>(260)</u>	<u>()</u>	<u>()</u>
Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>						<u>72</u> <u>80</u>	<u>-</u>	<u>72</u> <u>80</u>
Employee Purchased Transp.								
*Entertainment								
*Parking								
*Guest Meals						<u>13</u> <u>11</u>	<u>-</u>	<u>13</u> <u>11</u>
Company Paid Transportation								
Leased Car Maint. (Detail Over)								
*Other						<u>2</u> <u>-</u>		<u>2</u> <u>-</u>
Total Expense					<u>6</u> <u>74</u>	<u>101</u> <u>02</u>		<u>107</u> <u>76</u>

Account Distribution:

Advances:

(Cash, Check, Hotel deposits)

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
	<u>14</u>	<u>09</u>	<u>900</u>			<u>6257-01</u>	<u>76.50</u>
			<u>905</u>				
	<u>u</u>	<u>u</u>	<u>907</u>			<u>"</u>	<u>20.25</u>
			<u>920</u>				
			<u>410</u>				<u>6.74</u>
Total							<u>107.76</u>

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee

Amount due company

Purpose of Trip: Friday - Trip to Galesburg to attend Automation team Meeting
Thurs - Phone calls charge to personal calling card during Des Moines trip.
on 8-21/8-22 Charge 6251-01

Explain Expenditures Above By Day:

Sunday: _____

Monday: _____

Tuesday: _____

Wednesday: _____

Thursday: _____

Friday: 22) car wash
19) meal for R. Marky & c

Saturday: _____

Wednesday: _____

Thursday: _____

Friday: _____

Saturday: _____

Exhibit 24

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas A. Genise 10-3-95

Authorized For Reimbursement

E Braun 10/3/95

Date

Date Approved

1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas A.

3. Div/Dept. No. 039 / CC 350

4. Report No.

5. Dates of Expense: From 10-10-95 To 10-12-95

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date			10-10-95		10-12-95			
7. City			Galesburg		Milford			
State/Country			IL		MI			
8. Meals			14 29		9 97			24 26
9. Incidentals								
10. Hotel/Motel								
11. Subtotal								
12. Accounting Use Only								
County Code								
Per Diem Rate								
Variance								
13. Telephone								
14. Taxi, Auto Rental, Local Transp.								
Rate 28¢ per mile (miles)	()	()	(310)	()	()	()	()	()
Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>			86 80					86 80
16. Employee Purchased Transp.								
17. *Entertainment								
18. Parking								
19. *Guest Meals					9 97			9 97
20. Company Paid Transportation								
21. Leased Car Maint. (Detail Over)								
22. *Other			2 00					2 -
23. Total Expense			103 09		19 94			123 03

Account Distribution:

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
	14	09	900			6251-01	88.80
			905				
	14	1	907			"	24.23
			920				
Total							123.03

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee

Amount due company

123 03

Tuesday:

Purpose of Trip: Trip to Galesburg to meet with Jan Steeby and Doug Gooch, and to Kalamee to meet with Bud Richards. Thursday: Trip to Milford to test Autoskift on Kensington Grade. Charge: 6251-01

*Explain Expenditures Above By Day:

Sunday: _____

Monday: _____

Tuesday: 22) Car wash

Wednesday: _____

Thursday: 11) Meal for R. Markywick

Friday: _____

Saturday: _____

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Thomas A. Genise 10-17-95
Employee Signature Date

Authorized For Reimbursement

Approved

E. Braun 10/17/95
Date

1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas A

3. Div/Dept. No. 039 / 66356

4. Report No.

5. Dates of Expense: From 11-1-95 To 11-3-95

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date				<u>11-1</u>	<u>11-2</u>	<u>11-3-95</u>		
7. City				<u>Traverse City</u>	<u>Alpena</u>	<u>Southfield</u>		
State/Country				<u>MI</u>	<u>MI</u>	<u>MI</u>		
8. Meals				<u>32.98</u>	<u>9.15</u>	<u>10.14</u>		<u>52.27</u>
9. Incidentals								
10. Hotel/Motel					<u>59.40</u>	<u>63.72</u>		<u>123.12</u>
12. Accounting Use Only								
County Code								
Per Diem Rate								
Variance								
13. Telephone								
14. Taxi, Auto Rental, Local Transp.								
Rate per mile (miles)	()	()	()	()	()	()	()	()
Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>								
16. Employee Purchased Transp.								
17. *Entertainment						<u>7.95</u>		<u>7.95</u>
18. Parking								
19. *Guest Meals				<u>52.98</u>		<u>16.15</u>		<u>69.13</u>
20. Company Paid Transportation								
21. Leased Car Maint. (Detail Over)								
22. *Other					<u>20.00</u>			<u>20.00</u>
23. Total Expense				<u>83.96</u>	<u>88.55</u>	<u>97.98</u>		<u>270.49</u>

Account Distribution:

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
	<u>14</u>	<u>09</u>	<u>900</u>			<u>6251-01</u>	<u>193.12</u>
	<u>2</u>	<u>7</u>	<u>905</u>				<u>7.95</u>
	<u>4</u>	<u>4</u>	<u>907</u>				<u>16.15</u>
			<u>920</u>				
Total							<u>270.49</u>

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee

Amount due company

270.49

Purpose of Trip:

Trip to Northern Michigan to test AutoShift 7-Speed transmission.

*Explain Expenditures Above By Day:

Sunday:

Monday:

Tuesday:

Wednesday:

19) meals for J. Dresden III & R. Mark

Thursday: 22) Bridge Fare

Friday:

17) In-room movie
18) meals for R. Markhynek,
and J. Dresden III

Saturday:

9106
11/10/95

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Thomas A Genise 11-7-95

Employee Signature

Date Approved

Authorized For Reimbursement

J. Braun 11/7/95

Date



1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas A.

3. Div/Dept. No. 039/350

4. Report No.

5. Dates of Expense: From 11-13

To 11-28-95

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date		<u>11-13</u>	<u>11-28</u>	<u>11-22</u>				
7. City		<u>Galesburg</u>	<u>Novi</u>	<u>Southfield</u>				
State/Country		<u>MI</u>	<u>MI</u>					
8. Meals		<u>4 97</u>	<u>12 60</u>					<u>17 57</u>
9. Incidentals								
0. Hotel/Motel								
Accounting Use Only								
2. County Code								
Per Diem Rate								
Variance								
Telephone								
4. Taxi, Auto Rental, Local Transp.								
Rate _____ per mile (miles)	()	()	()	()	()	()	()	()
5. Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>								
6. Employee Purchased Transp.								
7. Entertainment								
8. Parking								
9. Guest Meals		<u>4 96</u>	<u>12 59</u>					<u>17 55</u>
0. Company Paid Transportation								
1. Leased Car Maint. (Detail Over)								
2. Other				<u>3 00</u>				<u>3 -</u>
3. Total Expense		<u>9 93</u>	<u>25 19</u>	<u>3 00</u>				<u>38 12</u>

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
			900			<u>6251-01</u>	<u>3.00</u>
			905			<u>5</u>	<u>17.55</u>
			907			<u>6251-01</u>	<u>17.57</u>
			920				
Total							<u>\$38.12</u>

Advances:
(Cash, Check, Hotel deposits)
Company paid transportation
Carry over from previous report (if applicable)
Amount due employee _____
Amount due company _____

Purpose of Trip: Monday) Trip to Galesburg - TCONA to Demo 7-speed AutoShift
Wednesday) Postage to mail (Priority) package to Customer (late)
Tuesday) Lunch while out Road Testing AutoShift Trucks
Charge 6251-01

Explain Expenditures Above By Day:

Sunday: _____

Monday: 19) Meal for R. Markytvreck

Tuesday: 19) Meal for R. Markytvreck

Wednesday: 22) Postage -

Thursday: _____

Friday: _____

Saturday: _____

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas A. Genise 12-1-95 Date Approved Brian 12/4/95 Date

30-1840 (Rev 7/93) Printed in U.S.A.

1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas A.

3. Div/Dept. No. 039 / CC-357

4. Report No.

5. Dates of Expense: From 11-22-95 To 12-5-95

		Sun	Tues	Tues	Wed	Thurs	Fri	Sat	Total
6. Date			11-22-95	12-5-95					
7. City			Townsend	Mendall					
State/Country			MA	MA					
8. Meals				5 27					
9. Incidentals									
10. Hotel/Motel									
12. Accounting Use Only	County Code								
	Per Diem Rate								
	Variance								
13. Telephone			14 78						
14. Taxi, Auto Rental, Local Transp.									
Rate _____ per mile (miles)	()	()	()	()	()	()	()	()	()
Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>									
16. Employee Purchased Transp.									
17. *Entertainment									
18. Parking									
19. *Guest Meals									
20. Company Paid Transportation									
21. Leased Car Maint. (Detail Over)									
22. *Other									
23. Total Expense			14 78	5 27					20 05

Count Distribution:

[illegible]

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee

Amount due company

Purpose of Trip: 11-22-95) → Calling Card Calls during 7-speed Auto Shift Test Trip
12/5/95) → Trip to Marshall to test Tap 2 truck.
Charge 6251-01

'Explain Expenditures Above By Day:

Sunday:

Monday:

Tuesday:

Wednesday:

Thursday:

Friday:

Saturday:

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature	Date	Approved
<i>[Signature]</i>	12-7-95	<i>[Signature]</i>

18/8/95

Date: _____

1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas A

3. Div/Dept. No. 039/350

4. Report No.

5. Dates of Expense: From 12-14-95 To 12-20

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date				12-20	12-14			
7. City				Galesburg	Deerborn			
State/Country				MT	MT			
8. Meals				8.00				
9. Incidentals								
10. Hotel/Motel								
12. Accounting Use Only								
County Code								
Per Diem Rate								
Variance								
13. Telephone								
14. Taxi, Auto Rental, Local Transp.								
Rate _____ per mile (miles)	()	()	()	()	()	()	()	()
15. Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>								
16. Employee Purchased Transp.								
17. Entertainment								
18. Parking								
19. Guest Meals				6.00				
20. Company Paid Transportation								
21. Leased Car Maint. (Detail Over)								
22. Other					15.64			
23. Total Expense				15.94	15.64			31.58

Account Distribution:

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
			900				
			905				
	74	09	907			6308-01	15.94
			920				
	74	02	278			6308-01	15.64
Total							31.58

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

DEC 27 1995

Amount due employee
Amount due company

31.58

Purpose of Trip: 12-14) Supplies for Franklin Planner 1996 - Storage Binder + 2 page Monthly calendar!
12-20) Trip to Galesburg to demo Auto Shift
Charge 6308-01

*Explain Expenditures Above By Day:

Sunday:

Monday:

Tuesday:

Wednesday:

14) 12-20 meal for R. Markyweh

Thursday:

22) 1996 Storage Binder + 2 page Monthly Calendar for Franklin Planner

Friday:

Saturday:

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas A Genise Date 12-22-95
 Authorized For Reimbursement [Signature] Date 12/22/95



Calson Corporation

Travel & Business Expense Report

1. Employee No. 29600

Name (Last, First, MI) Genise, Thomas A. 3. Div/Dept. No. 039/350 4. Report No. _____
5. Dates of Expense: From 1-16-96 To 1-16-96

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
Date			1-16					
City			Milford					
State/Country			MA					
Meals			22.65					22.65
Incidentals								
Hotel/Motel								
County Code								
Per Diem Rate								
Variance								
Telephone								
Taxi, Auto Rental, Local Transp.								
Rate per mile (miles)	()	()	()	()	()	()	()	()
Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>								
Employee Purchased Transp.								
*Entertainment								
Parking								
*Guest Meals			12.33					
Company Paid Transportation								
Leased Car Maint. (Detail Over)								
*Other								
Total Expense			24.65					

Amount Distribution:								Advances: (Cash, Check, Hotel deposits)			
Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount	Company paid transportation			
			900								
			905								
			907			6373-01	24.65	Carry over from previous report (if applicable)			
			920						24	65	
								Amount due employee			
								Amount due company			
						Total	24.65				

Purpose of Trip: Trip to Milford to test out a shift on hill
Charge to 6373-01

Explain Expenditures Above By Day:

Monday: _____

Tuesday: _____

Wednesday: _____

Thursday: _____

Friday: _____

Saturday: _____

19) Meal for R. Markhyvesh

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas A Genise Date 1-16-96 Authorized For Reimbursement R. Markhyvesh Date 1-22-96

4. Report No.

5. Dates of Expense: From 1-31-96 To 1-31-97

1-31-96

To 1-31-98

**Accounting
Use Only**

Advances:
(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee
Amount due company

52	80
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Total	52.80
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Purpose of Trip: Trip to Galesburg to Demo Mto Shift Software & meet w/ TCONA people. Lunch on road while testing trade.
Charge - 6373-01

Explain Expenditures Above By Day:

unday:

Sunday:

Wednesday:

Wednesday:

19) mials for R. Markhyer & Marcel Amussen ✓ (Goon4)

Thursday:

Friday:

Saturday:

his is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

~~Authorized For Reimbursement~~

Employee Signature

Date _____

Approved

Date _____



1. Employee No. 29600

2. Name (Last, First, MI)
Genise, Thomas A.

3. Div/Dept. No. 039 / CC 350

4. Report No.

5. Dates of Expense From 2-27-96

To 2-29-96

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date			2-27		2-29			
7. City			Kalamazoo		Detroit			
State/Country			MI		MI			
8. Meals			4.99		5.00			9.99
9. Incidentals								
10. Hotel/Motel								
Accounting Use Only								
2. County Code								
Per Diem Rate								
Variance								
Telephone								
4. Taxi, Auto Rental, Local Transp.								
Rate 1.28¢ per mile (miles)			(290)		(60)			(99)
5. Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>			81.20		16.80			98.00
6. Employee Purchased Transp.					7.00			7.00
7. Entertainment								
8. Parking			5.00					5.00
9. Guest Meals 207					2.00			2.00
10. Company Paid Transportation								
11. Leased Car Maint. (Detail Over)								
12. Other			2.00		15.00			17.00
13. Total Expense			93.19		37.80			130.99

Account Distribution:

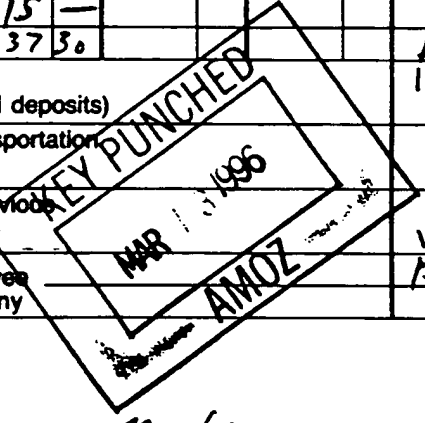
Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
			900			6341-01	115.00
			905				
			907			6341-01	14.49
			920				
						Total	129.49

Advances:
(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee
Amount due company



Purpose of Trip: Tues) Trip to Kalamazoo to attend Top 2 team meeting
Thurs) Trip to Cobo Hall - Detroit to attend SAE Tour & Exposition
Charge - Project # 6341-01

Explain Expenditures Above By Day:

Sunday: _____

Monday: _____

Tuesday: 1) meals for R. Markyvech
2) car wash

Wednesday: _____

Thursday: 1) meals for R. Markyvech
2) SAE Tour Fee

Friday: _____

Saturday: _____

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature: Thomas A. Genise 3-1-96 Date

Authorized For Reimbursement: [Signature] 3/1/96 Date



1. Employee No. 29600

2. Name (Last, First, MI)
Genise, Thomas A.

3. Div/Dept No. 029/350
5. Dates of Expense/ From 3-29-96 To 4-8-96

4. Report No.

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date		4-8-96				3-27-96		
7. City		Marshall				Reston		
State/Country		MI				MI		
8. Meals		4 43						4 43
9. Incidentals								
0. Hotel/Motel								
Accounting Use Only								
2. Telephone								
4. Taxi, Auto Rental, Local Transp.								
Rate <u>22</u> per mile (miles)		(30)						
5. Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>		8 40						8 40
6. Employee Purchased Transp.								
7. Entertainment								
8. Parking								
9. Guest Meals <u>907</u>		4 42						4 42
0. Company Paid Transportation								
1. Leased Car Maint. (Detail Over)								
2. Other						34 73		34 73
3. Total Expense		17 25				34 73		51 98

Account Distribution:							
Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
			900			6471-01	43.13
			905				
			907			6471-01	8.85
			920				
Total							51.98

Advances:
(Cash, Check, Hotel deposits)
Company paid transportation
Carry over from previous report (if applicable)
Amount due employee
Amount due company

Charge - 6471-01

Purpose of Trip: 3-29) Hardware Supplies for Volvo Auto Split truck
4-8-96) Trip to Marshall to Reno Auto Split truck

Explain Expenditures Above By Day:
Sunday:
Monday: 15) use personal car to take truck to truck wash on 4-5-96
19) meal for R. Markyrek
Tuesday:

Wednesday:
Thursday:
Friday: 22) Hardware Supplies for Volvo Auto Split truck
Saturday:

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas A. Genise Date 4-10-96

Authorized for Reimbursement [Signature] Date 4/15/96

1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas A.

3. Div/Dept. No. 039/C-350

4. Report No.

5. Dates of Expense From 4-19-96

To 5-3-96

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date		4-19-96	4-30-96	5-1	5-2	5-3-96		
7. City		Galesburg	Galesburg	Galesburg	Galesburg	Marshall		
State/Country		MI						
8. Meals		10 26	18 27	12 02	10 39	13 96		64 93
9. Incidentals								
10. Hotel/Motel								
Accounting Use Only								
2. County Code								
Per Diem Rate								
Variance								
Telephone								
4. Taxi, Auto Rental, Local Transp.								
Rate per mile (miles)								
5. Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>								
6. Employee Purchased Transp.								
7. Entertainment								
8. Parking								
9. Guest Meals <u>907</u>			2 60	1 25		13 95		17 80
10. Company Paid Transportation								
1. Leased Car Maint. (Detail Over)								
2. Other Gas + Car Wash			21 87	13 32	13 79			49 -
3. Total Expense		10 26	42 76	26 57	24 18	27 91		121 70

Account Distribution:

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
			900			6471-01	28.00
			905			5181-34	11.00
			907			5181-34	82.70
			920				
Total							131.70

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

38.00

Carry over from previous report (if applicable)

Amount due employee

Amount due company

131 70

Charge 5181-34 - \$93.70

Purpose of Trip: 4/19 → Galesburg Auto Split Demo/meeting

5/3 → Marshall Auto Split Demo

4/30 - 5/2 → VEHSM Class - Teaching

Charge - 6471-01 → \$38.00

Explain Expenditures Above By Day:

Sunday: _____

Monday: _____

Tuesday: 19) Greg Howell meals
22) Gas + Car wash for Co. Car

Wednesday:

19) Greg Howell meals
22) Gas for Co. Car

Thursday:

22) Gas for Co. Car

Friday:

19) J. Dresden meals

Saturday:

KEY PUNCHED
MAY 1996

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature: Thomas A. Genise 5-6-96

Date

Authorized For Reimbursement

Approved: AMOL

Date

5/15

1. Employee No. 29600

2. Name (Last, First, MI)

Genise, Thomas, A

3. Div/Dept. No. 039 / CC 350

4. Report No.

5. Dates of Expense: From 5-13-96

To 5-16-96

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
6. Date		5-13	5-14	5-15	5-16			
7. City		Indianapolis	Ind.	Ind.	Galesburg			
State/Country		Ind	Ind	Ind	MT			
8. Meals			8 94	9 14	19 37			37 50
9. Incidentals		4 95						4 95
10. Hotel/Motel				255 20				255 20
11. Subtotal								
12. Accounting Use Only								
County Code								
Per Diem Rate								
Variance								
13. Telephone			1 50					1 50
14. Taxi, Auto Rental, Local Transp.				9 00				9 00
Rate <u>31</u> per mile (miles)		(25)	()	(15)	(260)	()	()	()
15. Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>		7 75		4 65	80 60			93 00
16. Employee Purchased Transp.		469 60						469 60
17. Entertainment								
18. Parking				12 00				12 00
19. Guest Meals								
20. Company Paid Transportation								
21. Leased Car Maint. (Detail Over)								
22. Other		2 00	595 00	2 00	2 00			601 00
23. Total Expense		484 30	605 44	292 04	101 97			1483 75

Account Distribution:

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount
			900			6373-01	102.00
			906			6359-01	747.75
			907			6359-01	91.50
			920				
	04		410			6359-01	150
	09		911			6359-01	595.00
						Total	1483.75

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee

Amount due company

1483 75

Charge 102.00 to 6373-01
charge 1381.75 to 6359-01

Purpose of Trip: 5/13-5/15 Trip to Indianapolis to attend SAE TapTec Conference.

5-16 Trip to Galesburg to discuss R747 project and Antares project.

*Explain Expenditures Above By Day:

Sunday:

Monday:

Tuesday:

Wednesday:

Thursday:

Friday:

Saturday:

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas A. Genise 5-17-96

Authorized For Reimbursement

Robert A. [Signature] 5/23/96

Date Approved

Date

4. Report No.

5. Dates of Expense: From 5-21-16

To 5-22-78

Charge:- 6463-01

Saturday:

17) ~~the~~ Alcoholic Bev.
19) meals for R. Markyresh

5412

35 24

!n.

44.

Date

1. Employee No. 27600

Name (Last, First, MI)

3. Div/Dept. No. 039 / 357

4. Report No.

5. Dates of Expense: From 3-26-91 To 5-28-91

To 5-28-91

		Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
Date			3/26 → 3/27	5/28					
City									
State/Country									
Meals				11	34				11 34
Incidentals									
Hotel/Motel									
Accounting Use Only									
County Code									
Per Diem Rate									
Variance									
Telephone			70 02						70 02
Taxi, Auto Rental, Local Transp.									
Rate <u>31¢</u> per mile (miles)	()	()	(260)	(260)	()	()	()	()	
Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>			80 60	80 60					80 60
Employee Purchased Transp.									
*Entertainment									
*Parking									
*Guest Meals				3 36					3 36
Company Paid Transportation									
Leased Car Maint. (Detail Over)									
*Other				2 00	2 00				2 00
Total Expense			70 02	97 30					167 32

Count Distribution:

Advances:

(Cash, Check, Hotel deposits)

Company paid transportation

[illegible]

Carry over from previous report (if applicable)

Amount due employee

Amount due company

pose of Trip: 5/28 → trip to Galesburg to discuss R742/AutoShift projects.
 3-26/ to - 5/21 → trip phone charges from TCONVA, Mack Truck, SAE Tex Tec trips
 and business from home while sick Charge - 6492-01

Explain Expenditures Above By Day:

1 day:

nday:

Monday: 12) Car Wash
19) Lunch for Al Davis

Wednesday:

Thursday:

Friday:

Saturday:

s is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

Employee Signature Thomas Benise

Date _____

Authorized For Reimbursement

Approved

Date _____

1. Employee No. 29604

Name (Last, First, MI)

Genise, Thomas

3. Div/Dept. No. 039 / C6352

4. Report No.

5. Dates of Expense: From

To 6-20-96

		Sun	Thurs.	Thurs	Fri	Sat	Total
Date			6-6-96	6-17-96	6-18-96	6-20-96	
City			Galesburg	Snodgrass	Warren	Galesburg	
State/Country			MI	MI	MI	MI	
Meals			17 36		15 34		32 70
Incidentals							
Hotel/Motel							
Accounting Use Only							
County Code							
Per Diem Rate							
Variance							
Telephone							
Taxi, Auto Rental, Local Transp.							
Rate .31 per mile (miles)	()	()	(10)	()	(280)	()	()
Auto Expense Personal <input checked="" type="checkbox"/> Leased <input type="checkbox"/>			3 10		86 80		89 90
Employee Purchased Transp.							
*Entertainment							
Parking							
*Guest Meals 907			5 73				5 73
Company Paid Transportation							
Leased Car Maint. (Detail Over)							
*Other				6 94	28 50		35 44
Total Expense			23 09	10 04	28 50	102 14	163 77

Count Distribution:

[illegible]

Advances:
(Cash, Check, Hotel deposits)

Company paid transportation

Carry over from previous report (if applicable)

Amount due employee
Amount due company

Charge 6447-01 → 102.14
6484-02 → 61.63

Purpose of Trip: Thurs, 6-6 Trip to Galena, IL/Steel Stands to discuss K747 project

- Items, 6-13) Buy 'piece of wood for Auto Split' installation

Thurs, 6-20) Trip to Galveston to discuss VEHs in

Explain Expenditures Above By Day:

Today:

Monday: Thurs / 6/6/96 - 19/meal for Staci
Standa

Thurs/ 6-13-96 22) Piece of
wood for Autosplit project.

145 6-18-92

~~Wednesday.~~

Thursday:

Friday:

Saturday:

This is a true statement of all expenses incurred by me on behalf of the company for the period indicated.

NY-5 / 3428 Authorized For Reimbursement


Employee Signature

Date **Approved**

Date _____

1996 DIVISION SUPPORT PROGRAM

PROGRAM NUMBER & TITLE: 128 - Transmission Automation

CoRD PROGRAM MANAGER: D. G. Smedley

DIVISIONAL CHAMPION: S. A. Edelen

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$400,000	\$98,100	\$43,435	\$400,000

Objectives:

The purpose of this program is to provide advanced technology, original ideas, demand services, and other support to TCONA in the area of truck transmission automation systems. This program covers income projects primarily for the Transmission Automation Group within TCONA, but will include other systems or electronics work for Axle and Brake and the Advanced Chassis Group.

1996 Key Deliverables:

- 1/15 Ball ramp design package to TCONA
- 2/15 AutoShift advanced algorithms with shiftability
- 6/30 Top Two software for Mack Truck
- 6/30 Advanced x-y motor control algorithms

Accomplishments / % completion for the month of January:

A design review meeting was held and the ball ramp inertia brake design package was transferred to TCONA in early January. Two units were updated to the latest design level, with one placed on the test stand for durability testing and the other installed in the AutoShift vehicle and successfully demonstrated to TCONA on January 11. Deliverable 1 is 100% complete.

The AutoShift Shift algorithm was modified to include skip shifting, use of the shiftability algorithms, and was made more adaptive to actual engine braking effectiveness. The algorithms will be demonstrated in early February to TCONA. Deliverable 2 is 90% complete.

A meeting was held with Mack Truck to meet some of the people and learn about Mack's engine software in preparation for doing the Top Two software. We have received the development tools and software from Mack and will start in earnest on the effort in early February. Deliverable 3 is 5% complete.

The test set-up that will allow the dSPACE computer to control the x-y motors directly has been completed. This effort has been put on hold until it can be redefined. D. Gooch would like us to work on a redesign of the x-y shifter to allow the use of one style motor and ball screw before we develop new control algorithms. This deliverable is 0% complete.

Anticipated activity during the month of February:

Demonstrate the advanced AutoShift algorithms at TCONA.

Initiate the design of the Mack Top Two Software. Develop the calibration changes necessary of the Top Two DDECIII and the direct drive Super 10 transmission.

Redefine the x-y shifter project and initiate work.

1996 DIVISION SUPPORT PROGRAM

PROGRAM NUMBER & TITLE: 128 - Transmission Automation

CoRD PROGRAM MANAGER: D. G. Smedley

DIVISIONAL CHAMPION: S. A. Edelen

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$400,000	\$104,300	\$63,484	\$400,000

Objectives:

The purpose of this program is to provide advanced technology, original ideas, demand services, and other support to TCONA in the area of truck transmission automation systems. This program covers income projects primarily for the Transmission Automation Group within TCONA, but will include other systems or electronics work for Axle and Brake and the Advanced Chassis Group.

1996 Key Deliverables:

- 1/15 Ball ramp design package to TCONA
- 2/15 AutoShift advanced algorithms with shiftability
- 3/30 Ball ramp inertia brake control algorithms and prototype
- 3/30 Test modified pneumatic inertia brake
- 6/30 Top Two software for Mack Truck
- 6/30 Advanced x-y motor control algorithms

Accomplishments / % completion for the month of February:

The modified AutoShift software that includes skip shifting with the Jake brake and coordinated with the shiftability algorithm was demonstrated on February 7th at TCONA and transferred to M. Amsallen. Our work on the algorithms is completed.

A task was added to evaluate a modified pneumatic inertia brake used to speed up shifting. The pneumatic inertia brake was modified to use pyrolytic carbon friction materials and thicker reaction plates. An approach was developed to test the brake in a stationary vehicle. Test software was written that allows the AutoShift truck to be used as the stationary test stand. This task is 25% complete.

Mack's software and hardware package was received. Mack's diagnostic software, ENG2, is now working on a desk top PC but currently will not function from a laptop. The problem appears to be in the CONFIG.SYS and AUTOEXEC.BAT files since the desk top PC required changes to allow ENG2 to operate. We are having some difficulty getting the technical support from Mack to solve these problems in a timely fashion. This task is 10% complete.

An new deliverable was added to develop preliminary control algorithms to control the ball ramp inertia brake to provide a constant decel rate. Two control methods were tested. The first allowed the full range of PWM duty cycles at 400 Hertz and was found to be reasonably controllable. The second method limited the PWM duty cycles to discrete steps of 0, 20, 40, 60, 80, & 100 percent at 100 Hertz to simulate what would be obtainable with the ECU-B transmission manager. This method was much coarser but early testing was encouraging.

A production prototype of the ball ramp inertia brake is being built. It will reflect the all of development testing of last year. This brake will be available for testing in March. The brake will be evaluated for performance before being cycled and HALT tested.

Anticipated activity during the month of March:

Redefine the x-y shifter project and reinitiate work on the x-y shifter design and motor control algorithms.

Continue Mack Top Two development.

Continue testing of the modified pneumatic inertia brake.

Complete fabrication of production-like ball ramp inertia brake prototype, bench test and deliver to TCONA.

1996 DIVISION SUPPORT PROGRAM

PROGRAM NUMBER & TITLE: 128 - Transmission Automation

CoRD PROGRAM MANAGER: D. G. Smedley

DIVISIONAL CHAMPION: S. A. Edelen

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$400,000	\$348,800	\$126,405	\$400,000

Objectives:

The purpose of this program is to provide advanced technology, original ideas, demand services, and other support to TCONA in the area of truck transmission automation systems. This program covers income projects primarily for the Transmission Automation Group within TCONA, but will include other systems or electronics work for Axle and Brake and the Advanced Chassis Group.

1996 Key Deliverables:

- 1/15 Ball ramp design package to TCONA
- 2/15 AutoShift advanced algorithms with shiftability
- 3/30 Ball ramp inertia brake control algorithms and prototype
- 4/30 Test modified pneumatic inertia brake
- 9/30 Top Two software for Mack Truck
- 9/30 Advanced x-y motor control algorithms

Accomplishments / % completion for the month of February:

The pneumatic inertia brake was modified to use pyrolytic carbon friction materials and thicker reaction plates, and was tested on the vehicle tester. The brake was cycled 15,000 times with no problems. The plates still observed some "blueing", apparently due to high temperatures. A meeting was held on March 26 to decide what to do next. It was concluded that some form of positive forced lubrication is needed through the plates to keep them adequately cool. A simple method of routing pressurized oil from the transmission's internal oil pump into the plate I.D. was presented and discussed.

The development environment of the Mack Top Two project was modified slightly to speed up the development process: zip sockets were added for the FLASH memory chips and hex files from Mack's linker were post processed to reduce the number of programming steps. Mack's diagnostic ENG2 software is now running on the laptop computer. After talking to Mack, it was discovered that any computer running ENG2 must have virtually all of the computer's conventional memory available for its use, (620K of 640K).

Software has been written, incorporated into the Mack system and tested. Mostly this has been work on the SEL_GEAR module but many of the variables and constants for the entire Top Two system have been declared and/or defined.

A "Competitive Comparison" for the Mack system versus the AutoShift system has been prepared.

The prototype ball ramp inertia brake was fabricated and placed on the test stand for the HALT test. While the brake's performance was being characterized the test stand failed. The test stand is currently being repaired. The brake performed well, with the initial torque about 20% less than planned. This is probably due to the fact that the friction material was not yet worn in and the air gap is larger than it will be after burnish.

The project plan for the x-y shifter systems analysis was resubmitted and approved. The resources planned for the project had initiated another project and will not be able to start on this project until April.

Anticipated activity during the month of March:

Continue Mack Top Two development: get information from Mack on required Top Two data variables and continue coding the modules that will reside in the Mack controller.

Continue testing of the modified pneumatic inertia brake: the test will be redone with 2/3 of the Pyro Carbon removed (to let oil through) and modifications to the brake to allow an oil feed path. If this is successful, HALT testing of the design will begin to find how close the brake is to failing and what it's weak link is.

Continue HALT testing of the production-like ball ramp inertia brake prototype.

1996 DIVISION SUPPORT PROGRAM

PROGRAM NUMBER & TITLE: 128 - Transmission Automation

CoRD PROGRAM MANAGER: D. G. Smedley

DIVISIONAL CHAMPION: S. A. Edelen

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$400,000	\$368,632	\$144,778	\$400,000

Objectives:

The purpose of this program is to provide advanced technology, original ideas, demand services, and other support to TCONA in the area of truck transmission automation systems. This program covers income projects primarily for the Transmission Automation Group within TCONA, but will include other systems or electronics work for Axle and Brake and the Advanced Chassis Group.

1996 Key Deliverables:

- 1/15 Ball ramp design package to TCONA
- 2/15 AutoShift advanced algorithms with shiftability
- 3/30 Ball ramp inertia brake control algorithms and prototype
- 4/30 Test modified pneumatic inertia brake
- 9/30 Top Two software for Mack Truck
- 9/30 Advanced x-y motor control algorithms

Accomplishments / % completion for the month of April: Percent complete - 35%

Work on the high torque CEEMAT inertia brake development continued. A test was run using the integral oil pump in the transmission. The plates looked excellent with very little discoloration and evidence of heat. It was concluded that an adequate supply of oil needs to be fed into the ID of the plates in order for them to stay cool. A HALT test of the "reaction joint" (the center shaft reaction to the case, consisting of a press fit and a "square drive") was run. It took 475 lb-ft to break the joint - the failure being the splitting of the square drive piece bolted to the end of the shaft. After consultation with the team, it was decided not to continue development of this brake for the 10-speed AutoShift, since software does not exist to control the brake.

An AutoSplit system was installed in a Volvo truck and successfully demonstrated to Volvo. It was then demonstrated to a larger group of TCONA personnel on April 19th and a meeting was held to discuss the future of the product.

Progress on the Mack Top Two has resumed after the Volvo AutoSplit Demo and continues to progress well. About half of the software code needed has been designed, written, compiled, and integrated into the system and checked out on the bench. A truck has been identified and should be shipped to CoRD-DC the week of May 13th, or the week of the 20th the latest. Truck integration should begin in early June if all goes well.

The inertia brake test stand was repaired and is back up and running. A meeting on the HALT testing process was attended. The plan was to learn at the meeting what is needed to develop the HALT test plan. The meeting did not accomplish this, the test plan is still not complete, and testing did not start.

Anticipated activity during the month of May:

Continue Mack Top Two development: continue software development, receive Mack truck, and attend a

meeting at Mack to clear up any problems.

Demonstrate AutoSplit to Mack personnel and then move the AutoSplit to a different vehicle.

Continue HALT testing of the production-like ball ramp inertia brake prototype.

1996 DIVISION SUPPORT PROGRAM

PROGRAM NUMBER & TITLE: 128 - Transmission Automation

CoRD PROGRAM MANAGER: D. G. Smedley

DIVISIONAL CHAMPION: S. A. Edelen

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$400,000	\$378,632	\$178,812	\$400,000

Objectives:

The purpose of this program is to provide advanced technology, original ideas, demand services, and other support to TCONA in the area of truck transmission automation systems. This program covers income projects primarily for the Transmission Automation Group within TCONA, but will include other systems or electronics work for Axle and Brake and the Advanced Chassis Group.

1996 Key Deliverables:

1/15	Ball ramp design package to TCONA	Completed
2/15	AutoShift advanced algorithms with shiftability	Completed
3/30	Ball ramp inertia brake control algorithms and prototype	Completed
7/30	Test modified pneumatic inertia brake	Tasks added
9/30	Top Two software for Mack Truck	50%
9/30	Advanced x-y motor control algorithms	10%

Accomplishments / % completion for the month of May:Percent complete - 40%

A meeting was held at TCONA to discuss continuing work on the high torque CEEMAT inertia brake. Plans were made to continue HALT testing the inertia brake and to build 25 units for an AutoShift LQR in October.

The Volvo AutoSplit truck was demonstrated to Mack in early May. The demonstration was successful. The AutoSplit was removed from the Volvo truck and the truck was returned to stock condition and returned to TCONA. A new Navistar vehicle will be leased for continued AutoSplit development.

Approximately 80% of the software code needed for the Mack Top Two has been designed, written, compiled, integrated into the bench top system, and checked out. More complete testing of the modules is continuing while awaiting the delivery of the test vehicle, scheduled now for May 28th. A trip to Mack was made on May 22nd and many issues were discussed, however there was not enough time for a code walk through. An issue of a 90 millisecond update rate on the output shaft speed could not be resolved for this demonstration system, but can be in a production design. Therefore the demonstration system's performance will be somewhat degraded. A tentative demonstration date for Mack was set for August 13th at TCONA.

HALT testing of ball ramp inertia brake was done in May. In the test, an inertia equivalent to 2 diesel engines was driven to 2000 rpm, the brake applied at a certain torque level until the speed was reduced to 100 rpm, then the brake was released and the inertia brought back up to 2000 rpm. The process was repeated for 600 cycles, then the torque level increased. When the torque reached 400 lb-ft, the friction material failed by becoming unbonded. The test procedure has been changed to keep the energy level below what the friction material is designed for and allow larger torques be applied. The testing has been restarted and should be a better test of the strength and durability of the mechanical components.

Work was started on the x-y shifter systems analysis in May. A spreadsheet was prepared to assist in the systems analysis of the motor and ball screw design requirements. It calculates the motor specifications based

on the given force load at shifter finger tip and the desired response time. Also, the prototype x-y shifter with the inductive sensors was installed in a fixture and the hardware-in-the-loop system was assembled to support the characterization of the current design.

A new project was initiated to help the R-747 team at TCONA solve some sensor and control issues associated with the R-747 transmission. One meeting was held to discuss the splitter control and some suggestions were made that are being analyzed. Further meetings have been scheduled.

Anticipated activity during the month of June:

Continue Mack Top Two development: continue software development, receive Mack truck, and begin software integration.

Continue HALT testing of the production-like ball ramp inertia brake prototype.

Continue testing of the pneumatic inertia break.

Continue to work on the x-y shifter systems analysis.

Provide consulting support on the R-747 transmission program.

1996 DIVISION SUPPORT PROGRAM

PROGRAM NUMBER & TITLE: 128 - Transmission Automation

CoRD PROGRAM MANAGER: D. G. Smedley

DIVISIONAL CHAMPION: S. A. Edelen

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$400,000	\$432,432	\$231,826	\$400,000

Objectives:

The purpose of this program is to provide advanced technology, original ideas, demand services, and other support to TCONA in the area of truck transmission automation systems. This program covers income projects primarily for the Transmission Automation Group within TCONA, but will include other systems or electronics work for Axle and Brake and the Advanced Chassis Group.

1996 Key Deliverables:

1/15	Ball ramp design package to TCONA	Completed
2/15	AutoShift advanced algorithms with shiftability	Completed
3/30	Ball ramp inertia brake control algorithms and prototype	Completed
7/30	Test modified pneumatic inertia brake	90%
9/30	Top Two software for Mack Truck	50%
9/30	Advanced x-y motor control algorithms	10%

Accomplishments / % completion for the month of June: Percent complete - 50%

HALT testing of the high torque CEEMAT inertia brake for the AutoShift continued. The unit was tested at 175 psi maximum pressure for 2500 cycles, and it has shown that the external oil pump provides the increase in heat capacity needed. The heat "blueing" was about 1/2 that seen with no external pump oil supply at 110 psi and 2500 cycles. The brake was then cycled 10,000 times at 110 psi. When completed, the plates looked very good, with only mild heat discoloration on the reaction plates and the friction plates looked good. Parts for four additional brakes were ordered.

A trip to Mack's Hagerstown, MD facility was made on May 23, 1996. Top Two development and production issues were the focus of the trip. A trip report was written and submitted. The software was worked on briefly, however, the Mack test vehicle, scheduled for delivery at the end of May has been put on indefinite hold since Mack needs it for internal reasons. Therefore, further software development has also been put on hold.

HALT testing of the ball ramp inertia brake continued. The unit was tested with plates using slots in the friction material to increase the materials energy capabilities. With four slots per side on the friction plates, the brake was tested to 600 lb-ft (3 times the design rating) before the friction material failed. Friction plates with 8 slots per side are currently being tested.

The systems analysis approach for the x-y motor and ball screw design has been established and will be reviewed with A. Davis and D. Gooch on July 1. The analysis consists of a spreadsheet estimating the potential motor parameters based on the requirement of the mechanical system and electro-mechanical physical principals. The response time is a fixed goal, while the motor acceleration and deceleration time are assumed in order to estimate motor characteristics. Also, a model was established, using Matlab and Simulink to automate the task of searching for the valid screw lead values which will move the shift finger to the desired stroke in the shortest time possible. This model will also plot position, speed response for each lead value, and the lead-

response time curve. It will be used to select the optimal lead with minimum response time for a given motor. To that end, several motors were evaluated by using the analysis tool. Motor vendor EMW Groschopp was contacted about the specifications on possible new motors. Thomson Saginaw was contacted about standard screw leads.

Anticipated activity during the month of July:

Components to build four pneumatic inertia brakes will be procured, sent to TCONA, and a final report on the project will be written.

TCONA will be updated on the status of the x-y shifter project. Further systems analysis will be done and testing of the inductive sensor will begin using the hardware-in-the-loop simulator.

Complete HALT testing of the production-like ball ramp inertia brake prototype and begin test report.

Provide consulting support on the R-747 transmission program.

1. Employee No. 29200

3. Div/Dept. No. 039 / 4350

4. Report No.

5. Dates of Expense: From 5/14/96 To 2/1/97

From 5/16/96

To 2/1/92

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
● Date		7-1-96						
7. City		Marshall, Ga						
State/Country								
8. Meals		4 36						4 36
9. Incidentals								
0. Hotel/Motel								
Subtotal								
Accounting Use Only								
2. County Code								
Per Diem Rate								
Variance								
● Telephone		55 99						55 99
4. Taxi, Auto Rental, Local Transp.								
Rate _____ per mile (miles)	()	()	()	()	()	()	()	()
5. Auto Expense Personal <input type="checkbox"/> Leased <input type="checkbox"/>								
6. Employee Purchased Transp.								
7.*Entertainment								
● Parking								
9.*Guest Meals		4 55						4 55
0. Company Paid Transportation								
1. Leased Car Maint. (Detail Over)								
2.*Other								
3. Total Expense		65 10						65 10

Advances:
(Cash, Check, Hotel deposits)

Div.	Gr	Cl	Sub	Dept	Prod	Source	Amount			
			900					Company paid transportation		
			905					Carry over from previous report (if applicable)		
			907			6484-02	9.11			
			920					Amount due employee	65	10
		04	410			6484-02	\$5.99	Amount due company		
						Total	65.10			

• Purpose of Trip: 7/1/96 - Trip to Marshall PG for Auto Split Demo / 5/16 → 6/30 → trips to
Galesburg → use of personal cell phone ~~to~~ - 8484-03

Wednesday:

Thursday:

Friday:

Saturday:

~~Authorized For Reimbursement~~

Authorized For Reimbursement
Approved

Date

Project: 6373-01
Engineer: T. Genise
Sponsor: 0061
Bud Cat: 03

TITLE: AUTOSHIFT SUPPORT
Program Plan #128 Program Manager: D. G. Smedley

MARCH 1996

OBJECTIVE

To develop a near-term transmission inertia brake with the capacity to decelerate the inertia of the engine.

WORK/PROGRESS/ACCOMPLISHMENTS LAST MONTH

Several iterations of brake configurations were tested. A new, slightly larger, production-representative piston set was designed and fabricated. First, pyro-carbon plates with thicker reaction plates were tested to 15,000 cycles with little or no wear and no plate warping or performance degradation, but the reaction plates show "blueing discoloration" from excessive heat.

Next, "pitot tubes" were added to the gear to pump oil into the plate I.D. These were tested to 17,000 cycles with the same result. Thirdly, 3 3/8 inch wide radial grooves were added to each side of the friction plates. After 2,500 cycles, it was evident that the plates were still getting too hot.

After a meeting at TCONA, it was concluded that some form of positive forced lubrication is needed through the plates to keep them adequately cool. A simple method of routing pressurized oil from the transmission's internal oil pump into the plate I.D. was presented and discussed.

NEXT MONTH'S PLANS

The test will be redone with 2/3 of the Pyro Carbon removed (to let oil through) and modifications to the brake to allow an oil feed path. If this is successful, HALT testing of the design will begin to find how close the brake is to failing and what is the weak portion of it.

PROJECT REPORT - APRIL, 1996

Title: AUTOSHIFT SUPPORT
Project: 6373-01
Engineer: Thomas Genise
Sponsor: 0061 - TCONA
Bud Cat: 03
Program #: 128
Program Mgr.: D. Smedley

OBJECTIVE

To develop a near-term transmission inertia brake with the capacity to decelerate the inertia of the engine.

WORK/PROGRESS/ACCOMPLISHMENTS FOR APRIL

A new test was prepared that uses the integral oil pump in the transmission. Currently, this oil is pumped through an external cooler to keep the transmission cool during the in-truck "parking lot" inertia-brake test. For this new test iteration, a portion of this oil is bled off and fed through the brake. The brake is getting about a 8 to 10 psi supply of oil through a 5/32 hole through the bolt. The test was run with new reaction plates for 2,500 cycles. The plates looked excellent with very little discoloration and evidence of heat. It was concluded that an adequate supply of oil needs to be fed into the I.D. of the plates in order for them to stay cool. It was also concluded that the brake should live well under the expected duty cycle - if it is fed with a supply of oil across the plates.

A HALT test of the "reaction joint" (the center shaft reaction to the case, consisting of a press fit and a "square drive") was ran. It took 475 lb-ft to break the joint - the failure being the splitting of the square drive piece bolted to the end of the shaft. For reference, the brake puts about 150 lb-ft to this joint.

After consultation with TCONA it was decided not to continue development of this brake for the 10-speed AutoShift since software does not exist to operate it. There is about \$3,000 left in this project. Al Davis suggests it be used to develop an integral pump in the brake - perhaps using torque convertor-like vanes - that supplies it with enough lube to keep it cool. This \$3,000 will probably allow for one iteration in the model shop and one test.

PLANS FOR MAY

Study the integral pump option and fabricate a prototype for test.

PROJECT REPORT - MAY, 1996

Title: AUTOSHIFT SUPPORT
Project: 6373-01
Engineer: Thomas Genise
Sponsor: 0061 - TCONA
Bud Cat: 03
Program #: 128
Program Mgr.: D. Smedley

OBJECTIVE

To develop a near-term transmission inertia brake with the capacity to decelerate the inertia of the engine.

WORK/PROGRESS/ACCOMPLISHMENTS FOR MAY

After a short delay of continued progress while defining further plans with TCONA, efforts resumed with a first overload phase HALT test of the inertia brake, using the transmission internal oil pump for forced lubrication and cooling through the brake. Although the reaction plates showed some discoloration (or blueing) from heat, the discoloration was only about half of that seen during the baseline testing without the oil pump. The increased energy amount absorbed by the brake is about 25% above baseline for this first HALT phase.

Plans are being made with TCONA to continue this testing and development for 25 units to be placed in a LQR AutoShift release in October.

The current Cost Limit for this project is spent. A revised Project Record will be prepared shortly.

PLANS FOR JUNE

Continue HALT testing as planned until either failure after 2,500 cycles, or enough confidence is reached. Then, one brake will be cycled under normal test conditions until 100,000 cycles is reached. A brake will be built up for testing and software development at TCONA.

PROJECT OPENING RECORD

TITLE: AUTOSPLIT DESIGN SPECIFICATION	Project No.: 6249-01 Sponsor: 0061 Budget Cat.: 03 Cost Center: 0380 Project Leader: GENISE T A Program No.: 128
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MISSION, TECHNICAL OBJECTIVES, IMPACT:

MISSION

To create a Functional Performance Specification and a Design Requirements Specification for the AutoSplit transmission product.

TECHNICAL OBJECTIVES

Using the Top-Two specifications and AutoSplit specification work completed to date (25% complete) as a starting point, complete the Functional Performance Specification and the Design Requirements Specification for the AutoSplit transmission product.

IMPACT

TCONA has identified the AutoSplit transmission concept as an integral part of their automation product strategy. However, the definition of the system and software requirements needs to be determined before commencing with the product development program.

CURRENT BUDGET: 12000

TIME LIMIT: 8/30/1995

DISTRIBUTION:

E BRAUN

PROJECT TEAM:

APPROVALS:

ACCOUNTING
PROJECT MGR.

WAGNER B R
GENISE T A

Date:

06/22/95
06/21/95

BUSINESS MGR.
PROGRAM MGR.

HOLMES R C
SMEDLEY D G

Date:

06/22/95
06/22/95

Year: 1995
Prog. No.: 128
Proj. No.: 6249-01
Version: 13

PHASE: E - EXPLORATORY

Resource Base

Deliverables

CORDDC

REPORTS

103 SYSTEM SPECIFICATION 8/95 / / / /
AUTOSPLIT FUNC. PERP. SPEC. AND DESIGN REQ. SPEC.

Year: 1995
Prog. No.: 128
Proj. No.: 6249-01
Version: 13

GANTT CHART

[illegible]

COST SPREAD SHEET

COST SPREAD SHEET				
Year	Month	Labor	Material	Total
Budget				12000
1995	JAN	0	0	0
1995	FEB	0	0	0
1995	MAR	0	0	0
1995	APR	0	0	0
1995	MAY	0	0	0
1995	JUN	2000	0	2000
1995	JUL	8000	0	8000
1995	AUG	2000	0	2000
1995	SEP	0	0	0
1995	OCT	0	0	0
1995	NOV	0	0	0
1995	DEC	0	0	0
TOTAL		12000	0	12000

PROJECT CHANGING RECORD

TITLE: AUTOSPLIT DESIGN SPECIFICATION	Project No.: 0249-04 Sponsor: 0061 Budget Cat.: 03 Cost Center: 0380 Project Leader: GENISE T A Program No.: 128
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MISSION, TECHNICAL OBJECTIVES, IMPACT:

MISSION
 To create a Functional Performance Specification and a Design Requirements Specification for the AutoSplit transmission product.

REASON FOR CHANGE
 This change requests additional time only. Due to other project priorities, more time is needed to complete this project. No additional funds are requested.

RESULTS TO DATE (8-19-95)
 The first draft of the AutoSplit Functional Performance Specification is complete and has been sent to TCONA for review/comments/approval. The first draft of the AutoSplit Product Design Specification is 50% complete.

TECHNICAL OBJECTIVES
 Using the Top-Two specifications and AutoSplit specification work completed to date (25% complete) as a starting point, complete the Functional Performance Specification and the Design Requirements Specification for the AutoSplit transmission product.

IMPACT
 TCONA has identified the AutoSplit transmission concept as an integral part of their automation product strategy. However, the definition of the system and software requirements needs to be determined before commencing with the product development program.

CURRENT BUDGET: 12000	TIME LIMIT: 10/30/1995
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DISTRIBUTION:

E BRAUN

PROJECT TEAM:

APPROVALS:		Date:		Date:	
ACCOUNTING	WAGNER B R	08/24/95	BUSINESS MGR.	HOLMES R C	08/24/95
PROJECT MGR.	GENISE T A	08/19/95	PROGRAM MGR.	SMEDLEY D G	08/21/95
	_____	/ /		_____	/ /
	_____	/ /		_____	/ /
	_____	/ /		_____	/ /

Year: 1995
Prog. No.: 128
Proj. No.: 6249-01
Version: 18

PHASE: E - EXPLORATORY

Resource Base

Deliverables

CORDDC

REPORTS

103 SYSTEM SPECIFICATION 9/95 / / / /
AUTOSPLIT FUNC. PERF. SPEC. AND DESIGN REQ. SPEC.

Year: 1995
 Prog. No.: 128
 Proj. No.: 6249-01
 Version: 18

GANTT CHART

Task	Date		Month												Cost
	Start	End	J	F	M	A	M	J	J	A	S	O	N	D	
1) FPS AND DRS PREPARATION	6/21	10/15													12000
	/	/													
	/	/													
	/	/													
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	/	/													
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	/	/													
	/	/													
Total Cost:															12000

COST SPREAD SHEET

Year	Month	Labor	Material	Total
Budget				12000
1995	JAN	0	0	0
1995	FEB	0	0	0
1995	MAR	0	0	0
1995	APR	0	0	0
1995	MAY	0	0	0
1995	JUN	2000	0	2000
1995	JUL	4000	0	4000
1995	AUG	4000	0	4000
1995	SEP	1000	0	1000
1995	OCT	1000	0	1000
1995	NOV	0	0	0
1995	DEC	0	0	0
TOTAL		12000	0	12000

1996 GROWTH PROGRAM - MONTHLY REPORT
APRIL

PROGRAM NUMBER & TITLE: 166 - Medium/Heavy Automatic Transmission

CoRD PROGRAM MANAGER: Thomas A. Genise

DIVISIONAL CHAMPION: Tim Morscheck - TCONA Automation Group

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$ 300,000	\$ 40,000	\$ 3,672	\$ 300,000

OBJECTIVE

To create a Medium/Heavy AutoShift transmission prototype and a Medium/Heavy Fully-Automatic transmission prototype and evaluate each for market potential through customer demonstrations.

Total Program Progress to Date: 1%

1996 Key Deliverables:

	<u>% Complete</u>
1) Medium/Heavy (M/H)AutoShift Design Study/Layout	2
2) M/H AutoShift Demo Vehicle with software	0
3) Next-Generation AutoSplit Prototype	0
4) Program Report	0

Accomplishments / % completion for the month of: April

Program Plan was written and approved. Tentative project team identified and assembled. AutoShift project being opened. Doug Hughes being brought up to speed on automation and will lead M/H AutoShift project. Software person - TBD.

Anticipated activity during the month of: May

- 1) Hold program team "KickOff" meeting to agree on deliverables, team member responsibilities, and timing. DONE 5-8-96
- 2) Write project plans and open projects.
- 3) Initiate procurement of vehicle, purchased parts, work orders.
- 4) Start work !!!

1996 GROWTH PROGRAM - MONTHLY REPORT

MAY

PROGRAM NUMBER & TITLE: 166 - Medium/Heavy Automatic Transmission

CoRD PROGRAM MANAGER: Thomas A. Genise

DIVISIONAL CHAMPION: Tim Morscheck - TCONA Automation Group

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$ 300,000	\$ 230,000	\$ 10,000	\$ 300,000

OBJECTIVE

To create a Medium/Heavy AutoShift transmission prototype and a second-generation AutoSplit transmission prototype and evaluate each for market potential through customer demonstrations.

Total Program Progress to Date: 3%

1996 Key Deliverables:

	<u>% Complete</u>
1) Medium/Heavy (M/H)AutoShift Design Study/Layout	5
2) M/H AutoShift Demo Vehicle with software	0
3) Next-Generation AutoSplit Prototype	1
4) Program Report	0

Accomplishments / % completion for the month of: May

- Medium/Heavy AutoShift project plan written and approved.
- Purchase orders for 2 sets of hardware entered.
- TCONA (Steve Edelen) talking with Navistar to obtain M/H truck.
- Doug Hughes coming up to speed quick.
- Trying to obtain designer soon.
- TCONA identified IH heavy truck for AutoSplit to be delivered soon.

Anticipated activity during the month of: June

- Start design layout for M/H AutoShift
- Open AutoSplit project and start work
- Accumulate hardware for bench and truck testing (M/H)

PROJECT OPENING RECORD

TITLE: VOLVO AUTOSPLIT RETROFIT	Project No.: 6471-01 Sponsor: 0061 Budget Cat.: 03 Cost Center: 0380 Project Leader: GENISE T A Program No.: 128
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MISSION, TECHNICAL OBJECTIVES, IMPACT:

MISSION
 To install the AutoSplit transmission system in a vehicle for demonstration and evaluation purposes.

TECHNICAL OBJECTIVES

- 1) Install the AutoSplit concept demonstration transmission system as demonstrated to TCONA in '94-'95 in a TCONA-supplied vehicle, repairing portions damaged in the previous removal.
- 2) Verify proper operation.
- 3) Demo it to TCONA personnel and TCONA customers.

CURRENT BUDGET: 12000	TIME LIMIT: 5/15/1996
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DISTRIBUTION:

PROJECT TEAM:

R MARKYVECH

J DRESDEN III

APPROVALS:

ACCOUNTING	WAGNER B R	Date: 04/05/96	BUSINESS MGR.	HOLMES R C	Date: 04/04/96
PROJECT MGR.	GENISE T A	03/27/96	PROGRAM MGR.	SMEDLEY D G	03/28/96
_____	_____	/ /	_____	_____	/ /
_____	_____	/ /	_____	_____	/ /
_____	_____	/ /	_____	_____	/ /

Year: 1996
Prog. No.: 128
Proj. No.: 6471-01
Version: 1

PHASE: D - DEVELOPMENT

Resource Base

Deliverables	CORDDC					
HARDWARE						
408 EATON DEMO VEHICLE	4/96	/	/	/	/	/

Year: 1996
 Prog. No.: 128
 Proj. No.: 6471-01
 Version: 1

GANTT CHART

[illegible]

COST SPREAD SHEET

COST SPREAD SHEET				
Year	Month	Labor	Material	Total
Budget				12000
1996	JAN	0	0	0
1996	FEB	0	0	0
1996	MAR	4600	200	4800
1996	APR	7000	200	7200
1996	MAY	0	0	0
1996	JUN	0	0	0
1996	JUL	0	0	0
1996	AUG	0	0	0
1996	SEP	0	0	0
1996	OCT	0	0	0
1996	NOV	0	0	0
1996	DEC	0	0	0
TOTAL		11600	400	12000

1996 GROWTH PROGRAM - MONTHLY REPORT

JUNE

PROGRAM NUMBER & TITLE: 166 - Medium/Heavy Automatic Transmission

CoRD PROGRAM MANAGER: Thomas A. Genise

DIVISIONAL CHAMPION: Tim Morscheck - TCONA Automation Group

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$ 300,000	\$ 300,000	\$ 32,000	\$ 300,000

OBJECTIVE

To create a Medium/Heavy AutoShift transmission prototype and a second-generation AutoSplit transmission prototype and evaluate each for market potential through customer demonstrations.

Total Program Progress to Date: 10%

1996 Key Deliverables:	<u>% Complete</u>
1) Medium/Heavy (M/H)AutoShift Design Study/Layout	10
2) M/H AutoShift Demo Vehicle with software	10
3) Next-Generation AutoSplit Prototype	10
4) Program Report	0

Accomplishments for the month of: June

- AutoSplit project plan written and approved.
- AutoSplit truck functional - to be demoed to RVI-Mack July 1st
- TCONA (Steve Edelen) still talking with Navistar to obtain M/H truck.
- Much M/H AutoShift hardware in.
- Layout started in the design room - trans. mock-up started in lab
- Tony Torre to do software design
- Four candidates interviewed

Anticipated activity during the month of: July

- Continue layout for M/H AutoShift
- Get rest of M/H hardware - start to build bench test setup
- Get Tony Torre up to speed on task
- Begin AutoSplit continued development (pending Mack Top Two project)

1996 GROWTH PROGRAM - MONTHLY REPORT
JULY

PROGRAM NUMBER & TITLE: 166 - Medium/Heavy Automatic Transmission

CoRD PROGRAM MANAGER: Thomas A. Genise

DIVISIONAL CHAMPION: Tim Morscheck - TCONA Automation Group

1996 SPENDING SUMMARY			
Budget	Approved	Spent YTD	Forecast
\$ 300,000	\$ 300,000	\$ 78,400	\$ 300,000

OBJECTIVE

To create a Medium/Heavy AutoShift transmission prototype and a second-generation AutoSplit transmission prototype and evaluate each for market potential through customer demonstrations.

Total Program Progress to Date: 25%

1996 Key Deliverables:	<u>% Complete</u>
1) Medium/Heavy (M/H)AutoShift Design Study/Layout	40
2) M/H AutoShift Demo Vehicle with software	15
3) Next-Generation AutoSplit Prototype	35
4) Program Report	0

Issues Potentially Impacting Deliverables:

- Software person not yet available to start software development for M/H AS

Continued on the next page.....

Growth Program 166 - Monthly Report, continued

Accomplishments for the month of July:

Medium/Heavy AutoShift

- Layout well underway now
- Ball-ramp inertia brake parts done
- Hardware mostly in
- Transmission build-up has begun

AutoSplit

- Wrote Functional Performance Spec. (FPS) for "AutoSynch Top-2" and TCONA delivered it to Caterpillar
- Started build of new driver display per FPS - nearly complete
- Demonstrated the system to RVI-Mack on July 1st

Anticipated activity during the month of August

Medium/Heavy AutoShift

- Continue layout for M/H AutoShift - Dave Preston > good job part-time
- Build bench test setup and get development system working > manpower
- Build-up transmission
- Start software modification

AutoSplit

- Finish new driver display and modify R747 shift knob
- Update vehicle system and software
- Demo to Caterpillar if ready

PROJECT CLOSING RECORD

TITLE: VOLVO AUTOSPLIT RETROFIT	Project No.: 6471-01 Sponsor: 0061 Budget Cat.: 03 Cost Center: 0380 Project Leader: GENISE T A Program No.: 128
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RESULTS ACHIEVED BY THIS PROJECT:

RESULTS

All goals of this project were achieved on time and under budget. The AutoSplit system was refurbished and installed in a Volvo vehicle and demonstrated to Volvo personnel with good reviews. It was then demonstrated to Mack personnel and many Eaton personnel with good reviews. The truck was then returned to stock condition and returned to the dealer.

As a result of this effort, TCONA decided that it must continue development of this project in 1996, and reallocated a portion of Growth program 166 to do this work instead of a Medium Duty AutoClutch.

AutoSplit development will continue under Program 166.

ESTIMATED COST TO DATE:

THRU:

PREVIOUS COST LIMIT: 20000

PREVIOUS TIME LIMIT:

6/30/1996

DISTRIBUTION:

PROJECT TEAM:

R MARKYVECH

J DRESDEN III

APPROVALS:

ACCOUNTING	WAGNER B R	Date:	06/17/96	BUSINESS MGR.	NELLUMS R A	Date:	06/17/96
PROJECT MGR.	GENISE T A		06/11/96	PROGRAM MGR.	SMEDLEY D G		06/14/96
			/ /				/ /
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